

Researchers Apply Gaming Technology in Medical Simulation



By: Laura Curtin, FHP&R Staff Writer

How effective is gaming technology at offering medical education or health benefits in a person's own living room? The possibility exists and the Telemedicine and Advanced Technology Research Center (TATRC) is investigating a variety of unexpected technology applications. TATRC's Armed Forces Simulation Institute for Medicine (AFSIM) is determining if learning, therapy, and social environments can be effective virtually and through simulation – compared to other conventional training and treatment methods.

“We want to know how people learn. By improving methods for training, we can and will make education an everyday exercise,” Dr. Thomas Talbot said.

Dr. Talbot is the chief research scientist for AFSIM and serves as a medical modeling, simulation, and training portfolio lead for TATRC. He manages research projects that look at new ways to use the latest technologies, some of which include Force Health Protection and Readiness' Defense Medical Research and Development Program (DMRDP) funded efforts. DMRDP research projects in the medical simulation portfolio are currently exploring new approaches for medical training and clinical rehabilitation.

New Technology Applications

According to the Centers for Disease Control and Prevention, medical mistakes cause 40,000 to 200,000 deaths per year in the United States. Simulation-based research could improve patient safety and

clinical effectiveness by offering engaging and efficient training that minimizes risk of mistakes while medical personnel hone skills. It's also vital to maintain clinical skills for thousands of military surgeons, anesthesiologists, and interventionists who are preparing to perform specialized procedures during or after deployment.

“What we're trying to do is take how we train our doctors and nurses and make it an approach grounded in science,” Dr. Talbot said. “Through science we'll be able to know when and what training is needed. We'll know that our people are up to the job.”

Improving Trauma Training

When medical professionals are prepared to respond quickly and appropriately to injuries in austere settings, they can improve patient outcomes. The Combat Casualty Training Consortium is one effort aimed for military medics to improve pre-hospital trauma training and some emergency room settings. The consortium is comparing training procedures that involve animals to medical simulators. A primary goal of the study is to create opportunities where it is possible to replace animals with simulation tools.

Originally developed under TATRC and AFSIM, CAE Healthcare's Caesar™ is under evaluation by the military to see if this new simulator can provide a realistic and physiologically advanced experience outside of the classroom in different types of terrain. Caesar™ is a combat trauma manikin that autonomously generates a wide range of responses detailing vital

signs and even verbal cues. Wireless and self-contained, it runs up to four hours on a single battery, is powered by a remote hand-held tablet, and most importantly, allows medics to transition from the classroom to real life scenarios. Following an exercise, the instructor has the ability to review an automatic event log that captures injuries and treatments. The event log offers review of decisions, actions, and care improvement strategies while the scenario is still fresh in a student's memory.

Medical Practice and Education

Developing medical training systems and competency assessments for sustained military medical readiness is another area where simulation can assist. A leading games developer, Breakaway LTD, is creating a hospital-based chemical/biological incident response game. It employs a multiuser, online, and collaborative environment.

The training system is inspired by the hospital management of CBRNE incidents out of the Army Medical Department capstone exercise course at the U.S. Army Medical Research Institute of Chemical Defense. The game focuses on mass casualty patient care, triage, and emergency response. It is intended for military treatment facilities, and the training system will satisfy accreditation requirements.

“Most of the time, we train towards helping a single patient,” Dr. Talbot said. “But how do we handle 50 or 100 casualties at once? Bombs and chemicals cause mass casualties. We need to practice teamwork against overwhelming odds



The CAE Caesar™ trauma patient simulator provides physiologically advanced responses that may improve medical training. (Photo courtesy of CAE, Inc.)

because hospitals can't respond well unless they rehearse for it regularly."

Virtual Trainer

Advancing user interfaces and offering interactive technologies for healthy living, medical practice, and patient rehabilitation is an important focus area for AFSIM – and help involve families in the recovery process.

AFSIM and commercial game development technology leaders are creating engaging, valid rehabilitation exercise games that use home devices and a motion controlled interface. The first of this effort for wounded warrior physical therapy, "Vitalize!", employs Microsoft Xbox Kinect video game technology.

The approach is to engage therapists and patients in game design and validate it with clinical trials. If found effective, doctors would have a tool that remotely monitors a patient's progress via the Internet.

Updating prescribed exercises also could be delivered remotely. The patient could have a virtual physical trainer in their own living room and blend rehabilitative exercise into game play shared with family and friends.

Kinect is a game console platform that has a sophisticated sensor to track full body motion. It senses depth and creates a 3D model. It also has a microphone that isolates the player's voice and cancels out background noise. With biometric facial recognition, it registers a saved player profile as soon as the person walks in front of the console. The person is the "controller," so there are no devices to hold because the technology tracks how fast or slow and where the body moves in relation to the virtual environment. It listens to commands and responds with no delay.

One example of how it has been used outside of a gaming purpose is by surgeons in the operating room. The 3D camera is connected to medical imaging equipment to better visualize the internal

organs of patients. It has been used as a remote mouse to view scans during surgery instead of reaching for a physical mouse in the middle of an operation. The console tracks a surgeon's hand to create a virtual mouse pointer, allowing the surgeon to remain focused on the procedure while still accessing information.

Simulation Possibilities

With technology and future medical simulation advances, personnel could practice existing medical skills and learn new medical knowledge continuously, instead of a few times a year. Service members could have more resources available to recover from an injury. It may even offer clinicians another measure to achieve successful therapy programs. It looks possible that in a few years personnel might connect with physical therapists, life coaches, doctors, teachers, or support groups by turning on a gaming console in their home, office, or medical treatment facility.